ENERGY NEWS

A quarterly publication of the Naval Facilities Engineering Service Center, Energy and Utilities Department

Major Renovations to U.S. Naval Academy

NFESC Specialists Investigate Problems in Bancroft Hall

The United States Naval Academy was founded as the Naval School in 1845. Located on 338 acres between the south bank of the Severn River and historic downtown Annapolis, Maryland, its 90-year old buildings make the Academy a National Historic Site.

Bancroft Hall, affectionately known as "Mother B," is the dormitory complex for the entire Brigade of Midshipmen. All 4,000 midshipmen (men and women representing each state in the nation and more than a dozen foreign countries) dine at the same time in the King Hall, a 65,000-square foot wardroom.

Major renovations and upgrades to the Academy's utilities systems have been underway and will continue for several years. Improvements to the domestic hot water and building heating facilities at Bancroft Hall are in process. As can be the case with many complex construction projects, not everything has gone according to plan.

In particular, several newly installed high temperature hot water (HTHW) system components have already failed.

Needless to say, this situation was alarming due to the inherent danger associated with operation of a HTHW system under high pressure.

A team of specialists from ***NFESC's Mechanical Systems Branch*** evaluated the situation, diagnosed the problems, and developed tangible solutions. Experienced Academy facility personnel provided insight into the probable causes and assisted in the development of solutions. The team's recommended corrective measures are currently in process, and when complete, cadets will be able to count on warm rooms and hot water.

Some of the HTHW system problems investigated at Bancroft Hall included:

- Persistent and alarming tube head cracking of the HTHW heat exchangers for domestic hot water.
- A heat exchanger tube bundle was leaking from the tube to the shell side.
- Isolation valves allowed HTHW to leak into the steam supply line.
- HTHW flange-sealing gaskets were leaking at the isolation valve.

(Continued on page 3)

United States Naval Academy - Bancroft Hall.

Inside ...

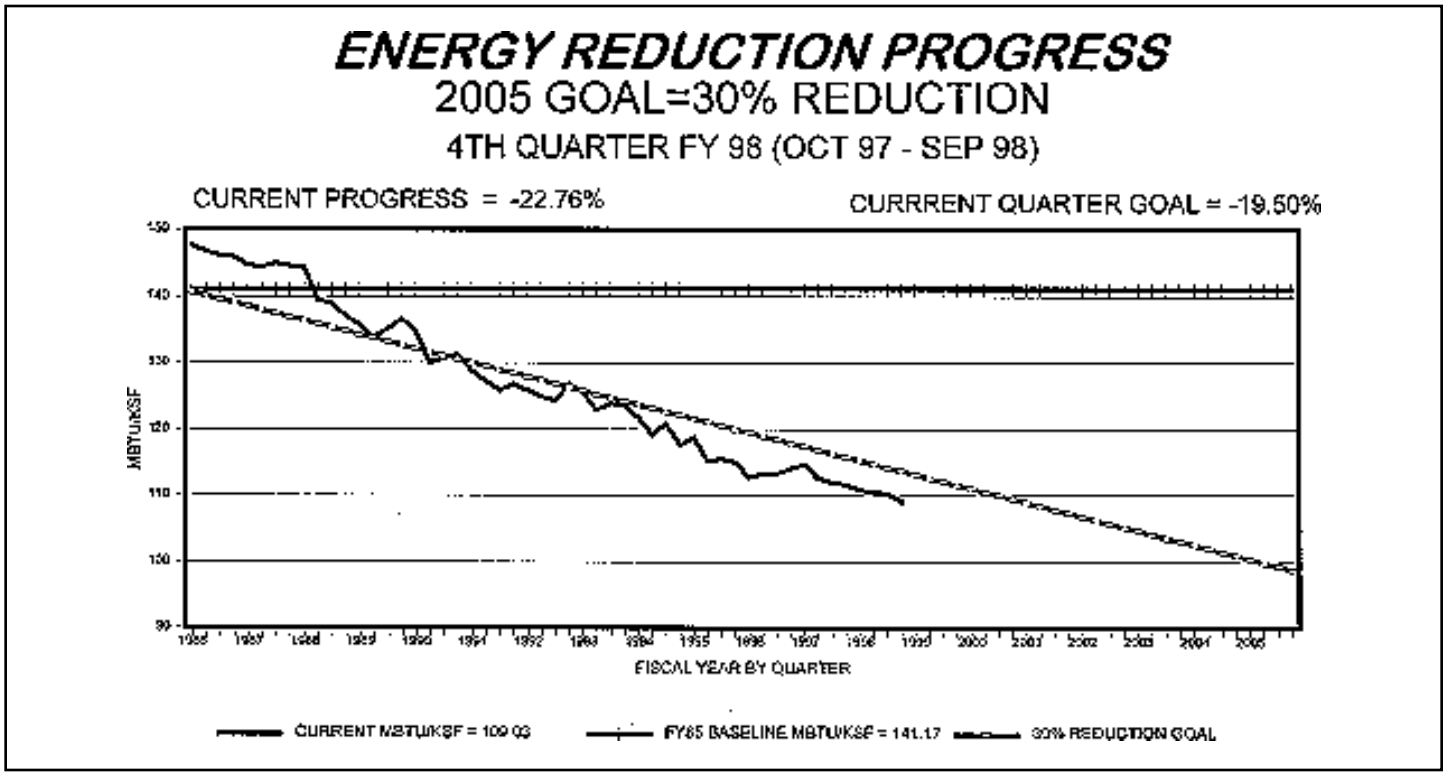
Naval Activity Energy Consumption for Oct 97 - Sep 98 (4th Qtr FY98)*

Includes Housing and Shore for Navy and Marine Corps Activities; excludes Government Owned/Contractor Operated (GOCO), Cold Iron, Transmitter, Simulator and Miscellaneous Support

Energy Type	MBtu Consumed		Change From FY85 (%)	By Energy Type (%)
	Oct 97 - Sep 98	FY85**		
Electricity	29,080,224	29,085,177	-0.02	43.83
Fuel Oils	10,860,795	26,995,765	-59.77	16.37
Natural Gas	21,891,402	25,544,167	-14.30	33.00
Propane Gas	229,903	314,986	-27.01	0.35
Coal	2,320,161	4,106,710	-43.50	3.50
Steam & Hot Water	945,882	1,288,378	-26.58	1.43
Residual	845,729	1,240,804	-31.84	1.27
Distillate	131,465	63,408	107.33	0.20
Reclaimed Oil	37,276	244,430	-84.75	0.06
Total (12 Months)	66,342,837	88,883,825	-25.36%	100.00%
Navy and Marine Corps (ksf)	608,472	629,638	-3.36%	
Navy and Marine Corps (MBtu/ksf)	109.03	141.17	-22.76%	
Navy Shore and Housing (MBtu/ksf)	115.18	149.68	-23.05%	

* The interim energy reduction goal for the end of September 98 is -19.50% below FY85 consumption. The percentage is derived by straight line interpolation of the 30% decrease per gross square foot from FY85 to FY2005.

** These FY85 figures incorporate all corrections approved to date.



(Major Renovations to U.S. Naval Academy; Continued from page 1)

High temperature hot water heat exchanger tube shell at the U.S. Naval Academy, Bancroft Hall.

- Premature flange-sealing gasket failures at the HTHW strainer basket/screen chamber.

Analysis included wet magnetic particle examination of the cracked tube head, evaluation of the HTHW and steam systems design, review of specifications and installation instructions for the failing equipment, and chemical testing of the HTHW and steam systems for impurities.

Once the problems were identified and understood, solutions became apparent. Some of the recommendations included:

- Relocate the temperature control valve on the HTHW heat exchangers from the hot water outlet to the inlet, thus eliminating excessive thermal stresses and water hammer on the tube head.
- Remove an unnecessary steam control valve, utilizing only one control valve to modulate HTHW control or steam into the heat exchanger.
- Rotate tube heads 90° to allow any condensed steam in the tube bundle to drain out and eliminate water hammer.

Tube bundle at the U.S. Naval Academy, Bancroft Hall.

- Replace substandard isolation valve seals on the HTHW side with seals designed to handle the temperature and pressure.
- Reinstall several isolation valves utilizing manufacturer's specified torque instructions.

NFESC's Mechanical Systems Team is ready to help you solve problems with new or existing facilities. Contact:

Steven Guzinski, Mechanical Systems Branch Head
(805) 982-3540 or DSN: 551-3540
E-mail: guzinskisj@nfesc.navy.mil

Team Members:

Chip Mathewson
(805) 982-1148 or DSN: 551-1148
E-mail: mathewsonc@nfesc.navy.mil

Mark Coleman
(805) 982-3549 or DSN: 551-3549
E-mail: colemanm@nfesc.navy.mil

New FY00 Life-Cycle Cost Analysis (LCCA) Spreadsheet Available

Based on the *National Institute of Standards and Technology's* ***"Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis - April 1999,"*** NFESC has just released the new Navy LCCA spreadsheet. A tool for the energy manager and decision maker, the spreadsheet facilitates realistic life-cycle cost analysis of energy projects by (1) helping the analyst organize information, such as construction costs, project category, and utility rates, and (2) calculating key economic performance indicators, such as savings-to-investment ratio, simple payback period, and life-cycle cost.

Procedures for energy project submittals for central funding have always required inclusion of an LCCA with the DD Form 1391 Military Construction Project Data package. Furthermore, the new energy management executive order released June 3rd mandates the use of life-cycle cost analysis in making decisions about investments in products, services, construction, and other projects to lower the Federal Government's costs and to reduce energy and water consumption. This spreadsheet facilitates compliance with these requirements.

The new LCCA spreadsheet is available now. You can download it from the Navy energy program website at ***http://www.nfesc.navy.mil/energy/program_mgt/project_lcc.html.*** If you would prefer to receive a copy on diskette or E-mail, you may contact ***Gene Crank at (805) 982-5589, DSN: 551-5589, or E-mail: crankev@nfesc.navy.mil.***

Introducing Dave Schuelke, New ESPC Team Leader

Dave Schuelke ***assumed the lead for the Department of the Navy's Energy Savings Performance Contracts (ESPC) Team upon Don Yokum's retirement at the end of March.*** His experience in the private and public sectors brings a wide range of engineering, technical, and contracts experience to the position.

Dave is an electrical engineer, registered as a Professional Engineer in California, and a Certified Energy Manager through the Association of Energy Engineers. He acquired his experience working both as a Navy Civil Engineer Corps Officer and as a civilian engineer in public works departments, a Navy Public Works Center, an Engineering Field Division, and several private engineering firms -- in addition to his work at ESC. He has worked in facility and utility design, construction, maintenance, repair, and contracts management and administration.

ESPC allows the Navy to use the best energy engineering firms to identify, fund, and implement energy savings projects that would otherwise be unavailable to many Navy and Marine Corps activities. Dave enjoys the opportunity to work with people in both the private and public sectors to develop these projects and save the Navy money on utility bills.

You can contact Dave with your ESPC questions at: (805) 982-3501, DSN: 551-3501 , or E-mail: schuelkejd@nfesc.navy.mil.

Y2K Concerns?

Lessons learned from the Ashore Systems Interoperability Test (ASIT) recently conducted at the Ventura County Naval Complex (VCNC) may be of interest. The Naval Construction Battalion Center (NCBC) Port Hueneme and Naval Air Station (NAS) Point Mugu, conducted a Y2K ASIT with technical assistance from NFESC.

The report, ***"Y2K Embedded Systems Ashore System Interoperability Test Report,"*** documents this effort and is available on these web sites:

- ***Naval Facilities Engineering Service Center: http://www.nfesc.navy.mil/y2k***
- ***Department of the Navy: http://www.doncio.navy.mil/y2k***
- ***Commander in Chief, Pacific Fleet: http://www.cpf.navy.mil/y2k***

A total of 14 systems were tested and all functioned properly. Outside the fence lines, utility providers were requested to perform concurrent testing. Only one outside utility provider, the wastewater agency serving NCBC, tested equipment concurrently with the Navy's ASIT. This test was successful.

For additional information, contact Peter Fanning, Utilities Engineering Division Director, ESC23, (805) 982-3564, DSN: 551-3564, or E-mail: fanningpk@nfesc.navy.mil or the NFESC Y2K Help Desk (805) 982-1364 or DSN: 551-1364.

Utility Plant Condition Assessments

Avoid Costly Power Outages

Equipment condition assessments are essential for safe and cost effective operation of utility plants. ***No matter what the cause, forced outages are costly.*** Knowing when a plant or one of its components needs to be replaced or repaired is vital. Steam power, heating, compressed air, or water treatment plants can all benefit from a condition assessment, remaining-life analysis, or life-extension analysis.

NFESC's Condition Assessment Team employs investigative tools and methods to estimate remaining equipment life, identify areas in need of immediate attention, and recommend repair or replacement options. Deterioration such as corrosion, erosion, fatigue cracking, creep, and combinations of these, are identified.

A change in operating conditions or procedures may be all that is necessary to entirely stop, or at the very least, reduce the rate of deterioration. The non-destructive examination and testing techniques used by the team are important, particularly in older systems constructed prior to 1980.

Various non-destructive methods are used to examine critical plant components:

History Reviews and Interviews. Plant maintenance information and historical record collection and examinations are reviewed.

Visual Inspection. Very few inspection methods can beat the trained eye. Visual inspection is usually the first method to detect problems of mechanical wear, chemical attack, or damage from thermal stress.

Chemical Analysis. A complete analysis of current water chemistry, water treatment logs, and chemical composition of boiler scale.

Ultrasonic Thickness Testing. Ultrasonic Thickness (UT) testing uses high frequency (above human hearing range), pulsed, sound waves to measure the thickness of a substance, usually steel.

Wet Fluorescent Magnetic Particle Testing. Wet Fluorescent Magnetic Particle Testing (WFMT) detects surface and near-surface flaws in weld-fabricated components, pressure vessels, cast items, and forged shafts.

Vibration and Alignment Analysis. Analysis of vibration amplitude peaks and associated frequencies can pinpoint the source of unacceptable vibration that can breakdown bearing lubricants and fatigue bearing metal.

Combustion and Boiler Efficiency. Boiler efficiency monitoring can reveal degradation and improve boiler performance.

Engineering Analysis. Engineering analysis and non-destructive testing help obtain the maximum life of power plant equipment and avoid costly power outages.

Mark Coleman is shown inspecting the internals of a boiler steam drum.

NFESC's Mechanical Systems Branch has an experienced team of engineers and technicians that have the equipment and know-how necessary to evaluate equipment condition, estimate remaining life, and formulate corrective action plans for Navy and Marine Corps utility plants.

Mark Coleman
(805) 982-3549 or DSN: 551-3549
E-mail: colemanm@nfesc.navy.mil
Steven Guzinski
(805) 982-3540 or DSN: 551-3540
E-mail: guzinskisj@nfesc.navy.mil

ESPC Update

Making ESPC Work For YOU!

To make the most of an Energy Savings Performance Contract or ESPC at your activity, an on-site individual should be identified to provide inspection, monitoring, verification, and coordination of contract services. Contracting Officer Representative, or COR, is the term applied to a person who represents the Contracting Officer on contracted work in the field and who knows when to refer issues to the Contracting Officer. Being a COR on an ESPC usually requires a person to have general knowledge of the utility and energy systems being worked on. Functions of a COR on these types of contracts include:

Inspection of contract work during the installation period. Contractors (Energy Service Companies, or ESCOs, as they are commonly called for this type of work) provide their own inspection and are under a high incentive to perform according to the contract. If energy savings are not achieved, they do not get paid. Consequently, government inspection for these types of contracts is not as crucial as with other types of contracts. Still, on-site personnel should understand the equipment being installed and be familiar with the terms of the contract.

Ensuring that operation and maintenance work is being performed. Most of the time, ESPCs require the contractor to perform O&M services, but it is sometimes performed by the activity if they request it. Problems occur more frequently in the latter case, usually due to funding constraints. If the ESCO is responsible for maintaining the equipment, they will usually keep on top of it because poorly maintained equipment does not use energy efficiently. Again, if the ESCO does not perform according to the contract, they don't get paid. It's the responsibility of the COR to ensure O&M is satisfactorily performed so the equipment can run efficiently.

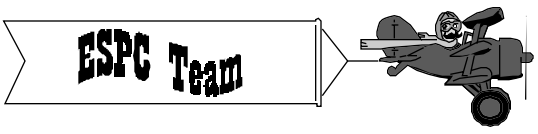
Tracking energy use. Tracking energy use is an important responsibility of an ESPC COR. Prior to the ESCO starting work, a baseline of energy consumption is established. The ESCO is responsible for meeting guaranteed energy savings as compared to this baseline. Energy savings are directly related to operating hours, load, and maintenance. The bottom line comes with the monthly utility bill. Problems can usually be identified quickly by a COR by routinely checking the monthly utility cost and equipment operation.

Monitoring changes from baseline conditions. Modifications to the baseline are sometimes needed due to significant facility changes or changes in operating hours, occupancy, and/or mission. Such changes should be documented and impacts to energy consumption estimated.

Checking invoices. Checking invoices for accuracy and satisfactory work performance and results.

This may sound burdensome, but a combined effort of about ***eight labor hours per year - per million dollars of ESPC installation*** is estimated to perform these functions so that maximum benefits will be achieved. Since keeping up with energy consumption and equipment efficiency should be part of an effective energy program anyway, the extra effort needed to monitor an ESPC should be minimal. Various people within the Public Works organization can share these responsibilities. Usually, the person serving as the activity Energy Manager is in the best position to serve as the ESPC COR. Training is available if needed. For more information, contact ***Dave Schuelke***.

If you have questions about ESPC, we have the answers!



Dave Schuelke
(805) 982-3501 or DSN 551-3501
E-mail: schuelkejd@nfesc.navy.mil

Energy Projects Progress

Financing projects through Demand Side Management (DSM) and Energy Savings Performance Contracting (ESPC) have become the norm for energy project awards.

FY99 ECIP funding has been distributed. $16.1M in energy projects will be implemented over the next few months. Although this program is expecting a decrease to just over $8M in FY00, $12 -13M in total funding is anticipated for FY01.

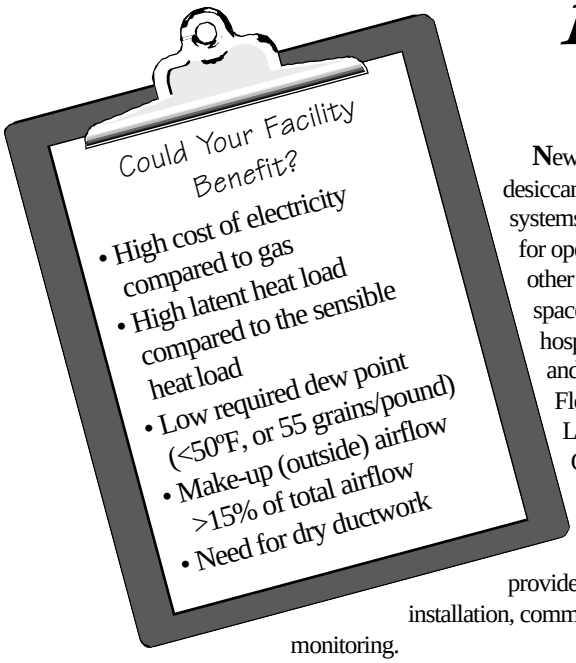
Energy Program FY99 progress was reviewed by the Energy Projects Development and Execution Team in March 1999. Strategies for the future was another topic of discussion.

FY99 Accomplishments to Date - A total of 24 DSM and ESPC projects have received or will receive incentive funds for using alternative financing this fiscal year. Incentives are applied to contracts to reduce financing terms or are used toward project development costs. These project costs totaled ***$73.2M***, earning incentives in the amount of ***$6.4M***, for an annual savings of ***$11.8M!*** In addition, a ***$4.4M*** ECIP project, "Boiler Plant Modifications - NAES Lakehurst," has been awarded.

Get involved in the energy program! For more information, contact your local EFD or: ***Mr. Dan Magro, NFESC, ESC222, (805) 982-3529, DSN 551-3529, or E-mail: magrodt@nfesc.navy.mil***

Desiccant Dehumidification Demo

Improve Humidity and Indoor Air Quality



New natural gas-fired desiccant dehumidification systems are being designed for operating rooms and other controlled humidity spaces at Naval hospitals in Pensacola and Jacksonville, Florida, and Camp Lejeune, North Carolina. This is being done under an *FY98 RDT&E program* that provides for system design, installation, commissioning, and monitoring.

Strong indications are that additional congressional RDT&E funding in FY00 will be earmarked for further desiccant dehumidification demonstrations at Navy and Marine Corps installations. ***NFESC is in the process of identifying candidate facilities and would like to hear from you by 30 September 1999, if you are interested. See the checklist above for some guidelines.***

Traditionally, humidity is removed from a building by cooling its ventilation air to condense moisture onto cooling coils in the HVAC system. This process is not very energy efficient, particularly in climates having relatively high temperatures and high humidity levels, and is not very accurate for applications requiring precise humidity control.

Desiccant dehumidifiers use desiccant to dry the air before it reaches the cooling coils to save energy in many ways. To name a few: (1) Eliminate inefficient reheat, (2) Dry out the cooling coils for more efficient heat transfer, (3) Switch from expensive electricity (especially in the summer) to cheaper gas as the primary energy source to remove humidity from the air, and (4) Allow thermostats to be raised in the summer without occupant comfort loss, since dry air is more comfortable at warmer temperatures than humid air.

Additionally, desiccant dehumidifiers improve humidity control and also improve indoor air quality (IAQ) by allowing separation of latent and sensible cooling, leading to better humidity control and increased comfort, irrespective of outdoor conditions. They also reduce or eliminate molds and bacteria by drying out coils, drip pans, filters and ductwork, thereby helping to solve odor problems and cure "sick building syndrome."

Some applications in which desiccant dehumidification can be beneficial are:

- *Mess Halls*. High latent heat loads due to moisture accumulation incident to food preparation, dishwashing, and sanitation processes.
- *Bachelor Officer and Enlisted Quarters.* High latent heat loads due to moisture from laundry, shower, and bathroom areas; routine replacement of wallpaper, carpet, etc., damaged by humidity.
- *Auditoriums.* High latent heat load. Large amounts of fresh air needed to remove CO_2. Dry ductwork would prevent the spread of microbes in large concentrations of occupants.
- *Movie Theaters.* Similar to auditoriums, theaters are primarily used at night when the sensible heat load from the outside is very low.
- *Office Buildings.* Similar to auditoriums, poor IAQ and disease transmission can affect personnel productivity and absenteeism.
- *Laboratories.* Electronic calibration labs and the like require precise humidity control; failure to do so can force work interruptions, affecting productivity and force readiness.
- *Day Care Centers and Schools.* High latent heat loads, IAQ, and disease transmission are issues. Schools are also at risk for humidity damage to books, other educational materials, and supplies.
- *Dormitories*. Similar to schools, with an added factor that dorms are primarily occupied at night when the sensible heat load is very low.
- *Warehouses.* Equipment and material storage is subject to humidity damage.

For a building evaluation or questions regarding participation in this program, contact Paul Kistler: (805) 982-1387, DSN 551-1387, or E-mail: kistlerpd@nfesc.navy.mil or Darryl Matsui: (619) 532-3985, DSN 522-3985, or E-mail: matsuids@nfesc.navy.mil.

On the Job with Mary Lingua

New Energy and Utilities Department Head Selected in February 1999

Mary is well known for her business and engineering acumen. She has played a key role in developing the strategic future of ESC products and services, and in building partnerships with clients, contractors, and other government agencies to deliver the most effective products. Mary is well-versed in strategic planning, customer partnership, quality management, and process improvement tools. She can be counted on to provide direction and leadership to any project with a focus on client needs.

Mary began her engineering career with the Navy over 20 years ago. Her journey to the Energy and Utilities Department Head position has included project engineering work, information systems development, business planning, technology base management, and acquisition planning, giving her a well-rounded and diversified perspective of energy and utilities engineering.

Mary is not new to the energy and utilities scene. She gained her first engineering experience investigating alternatives for pier side utilities, alternative energy sources, and oily waste management. Later she became the Energy and Environmental Program Manager for the Naval Civil Engineering Laboratory.

Mary has also held positions responsible for business planning and program development. She started new products in support of geographic information systems and machinery diagnostics that are thriving product lines in the Navy's shore facilities and utilities programs today. She has also worked at the Assistant Secretary of the Navy's Office.

Mary earned a Bachelors of Science Degree in Biology, a Masters of Science in Environmental Engineering, and a Masters of Science in Systems Management, all from the University of Southern California. She is a Registered Environmental Assessor in the state of California.

Mary spends her free time volunteering for various youth activities. She has been a Girl Scout Leader for the past 12 years. On cool autumn days or hot summer nights, you can find her at local campgrounds with a group of Girl Scouts exploring the world around them. She lives in Somis, California, with her husband Tracy and three teenage children.

If you have not had an opportunity to meet Mary in person, she will be visiting field activities over the next six months to develop interdependent relationships with field energy and utilities engineers. Or, if you get a chance stop by ESC, her door is always open.

If you have any questions about ESC or the Energy and Utilities Department, contact Mary at (805) 982-3534, DSN: 551-3534 or Email: linguamg@nfesc.navy.mil.

Augment Routine Diesel Engine Inspections

Professional Services Offered by NAVFAC's Fleet Certified Diesel Engine Inspector

Although the Navy requires routine inspections of ashore diesel engines of 400 horsepower or more by a Fleet Certified Diesel Engine Inspector (DEI), these inspections are typically overlooked. The limited number of certified inspectors or logistics problems are some of the reasons this task is neglected. ***NFESC's Fleet Certified DEI, Galen Marks***, is available to perform the non-intrusive inspections and services required by OPNAVINST 9233.1.

Galen Marks inspecting a 3,000 kW diesel engine at Harold E. Holt, in Western Australia.

Maintenance procedures for diesel engines can vary. If the unit is older, such as in the typical Navy stationary plant, the maintenance type prescribed is typically out of date. The condition of engines used for plant start up or emergency backup are usually assumed to be sound due to the low number of hours in operation. In fact, the age of an engine effects many parts and can take a toll on components such as oil coolers, hoses, belts, turbochargers, aftercoolers, and the like. In addition, the environment in which an engine is installed is crucial to the rate of internal component degradation.

NFESC engineers and technicians have performed vibration monitoring and diesel engine testing for many years. Our specialists can perform a non-intrusive, vibration-based inspection prior to the more intrusive, secured-phase inspection. Vibration-based analysis will alert the inspector to areas in the engine that require more attention during the internal inspection. Using this technology, the DEI can diagnose and correct minor equipment problems

(Continued on page 8)

A vibration test on the newly designed Mobile Utilities Support Equipment 1500 kW unit.

(Augment Routine Diesel Engine Inspections; Continued from page 7)

before catastrophic failures occur that may not be evident during a routine inspection.

NFESC can tailor services to fit your application. One or more of these three options may be utilized:

- A swift, non-intrusive, vibration-based assessment of moving components and combustion.
- An intrusive method of visually inspecting key critical components and tolerance measurements - *this is the required fleet inspection.*
- A combination of both the vibration-based and fleet inspections. Additionally, NFESC specialists can repair anomalies, assist in the repair process, offer advice on major work or rebuilds, and discuss the availability of various contracting approaches.

Reciprocating equipment, such as engines and compressors, require a great amount of maintenance. Properly done, maintenance can minimize the likelihood of large repair expenditures. Minor repairs can be performed in-house, compared to major repairs which are usually contracted out at high costs.

Predictive maintenance, coupled with the necessary DEI inspections, can correct many faults before they escalate into major repair or replacement costs. Procedures to prevent problem reoccurrence, how to lower maintenance costs, and increase equipment reliability can be suggested.

NFESC has the expertise and equipment to reliably determine the condition of diesel and gas engines, compressors, and various reciprocating equipment.

Contact Galen Marks for more information:
(805) 982-3541 or DSN: 551-3541
E-mail: marksgl@nfesc.navy.mil

Energy and Utilites Department - At Your Service!

Y2K Website:
http://www/nfesc.navy.mil/y2k

Mary Lingua, Department Head
(805) 982-3534 or DSN: 551-3534

Energy and Utilities Department Website:
WWW: URL http://energy.navy.mil

Electrical Utilities and Controls Division
Dave Holmes, Division Director
(805) 982-1368 or DSN: 551-1368

Energy Programs Division
James Heller, Division Director
(805) 3486 or DSN: 551-3486

Utilities Engineering Division
Peter Fanning, Division Director
(805) 3564 or DSN: 551-3564

ENERGY NEWS
Published By
NFESC
An unofficial publication of the
Energy and Utilities Department

Commanding Officer:
CAPT Robert J. Westberg
CEC, USN
Energy and Utilities Department Head:
Mary Lingua
Layout and Design:
Tara Elkinton, Publications Division, ESC73
(805) 982-1069 or FAX: (805) 982-1594

ADDRESS CORRECTION

Has your address changed? Please fill out the information below and fax this page to (805) 982-5388.

Name _____
Title _____
Telephone _____
E-mail _____
FAX _____
Organization _____
UIC _____
Street _____
City _____ **State** _____ **Zip** _____

Printed on recycled paper